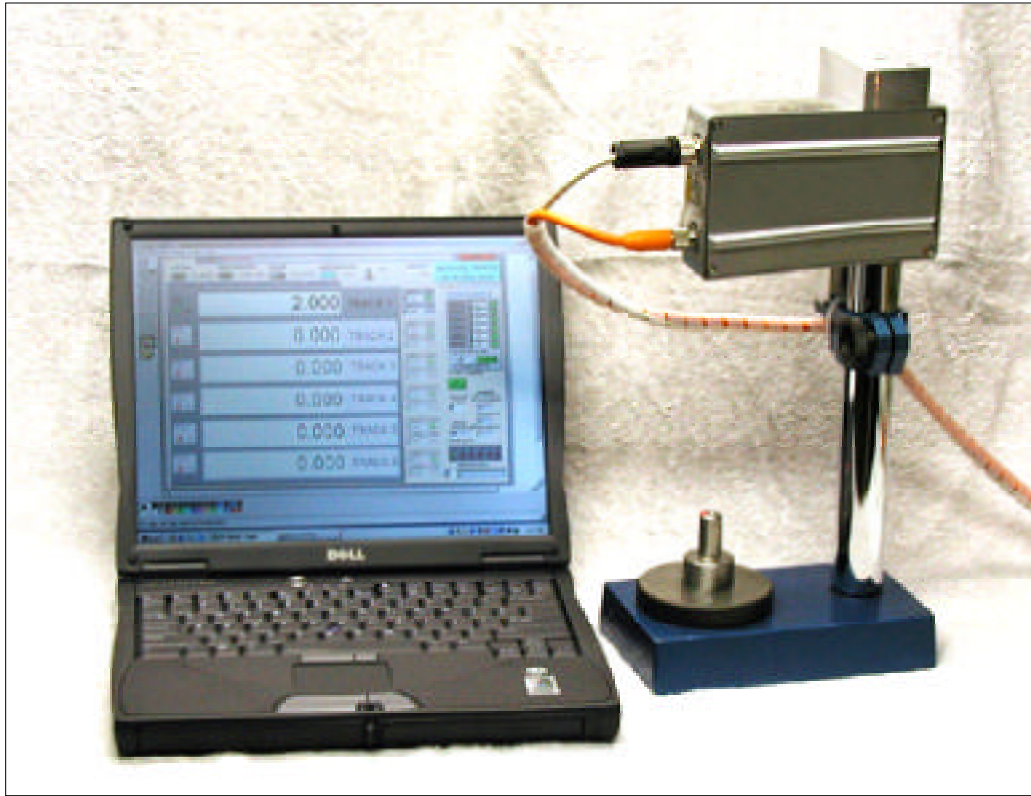


## Displacement Inspection Systems

## 2100 Century Series



Pictured above is a PC configuration of the 2100 century series. On the right the geometric laser is measuring the height of a 2 inch part. You can see the laser beam on top of the part. The software displayed on the PC is our Measure Tracks™.

### General Description

The 2100 Century Series of bench top inspection systems are designed for use in a laboratory and incoming inspection for quality control purposes. The system is easy to use for different size parts and when parts are to be inspected on a routine basis. Since the system includes a geometric laser for displacement measurements, hard, soft, open cell, and delicate parts can be objectively measured.

A large selection of geometric lasers is available to meet the accuracy and size requirements of parts to be measured. By selecting the correct geometric laser, a wide variation in part size can be measured without changing the physical setup. The principle of use is similar to a height gauge without the mechanical setup procedure. As a result, a measurement is fast and objective. Frequently soft parts can not be accurately measured with contact gauges, whereas with the 2100 century series soft parts are quickly and easily measured.

The operator can select displacement (height), deviation or thickness mode from the software. Differential thickness requires the use of two geometric lasers, one above and one below the part. By selecting the deviation mode, one can quickly measure a large number of parts and see the deviation from nominal with each part. All that is required is for the operator to place a part on the anvil.

### Features

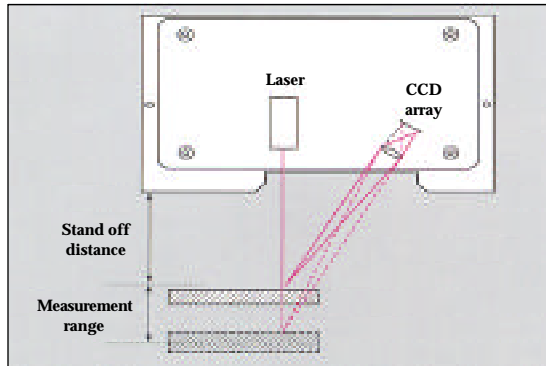
- Direct measurement of height or thickness to 2.5 microns
- Inch/mm selection
- Instant calibration
- Deviation/displacement mode
- Programmable library to store parts and tolerances
- Measure Tracks software for use with a PC or our PLC

### Benefits

- Fast and objective measurements
- Eliminates setup time
- Ideal for soft, delicate, and open cell material
- Does not mar surface
- Measures material with changing colors due to Digital Signal Processing (DSP)
- Large measurement range enables part size change without re-calibration
- Data logging of part measurements for use with Excel™
- Solid state laser diode provides long life

### Measurement Principle

The measurement technique is based on optical triangulation. One side of a triangle can be calculated when two other parameters are known, such as an angle which is measured and one side which is constant.



Pictured above is the measurement principle used in the geometric laser. The stand off distance is how far away the object must be to be measured. The measurement range is how much the object can move to or from the stand off distance and stay within the measurement range of the sensor. A CCD array is used to receive the reflected laser light from the object to determine the distance from the object.

### Digital Signal Processing

The geometric lasers used in the 2100 century series incorporate Digital Signal Processing (DSP) and CCD technology to significantly reduce the laser speckle problem. This enables them to easily measure materials ranging from black rubber to shiny steel. Even hot materials can be measured. A standard business card is a good example. If you measure a colored business card with the standard analog geometric laser you will get vast thickness differences as you pass over the different colors on the card. With DSP, the card will measure correctly, regardless of the color variation.

### System Configurations

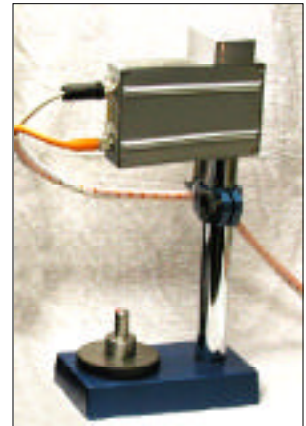
The 2100 series is offered in two configurations. It can be used with either a PC or our PLC. When used with the PLC, the PLC is mounted in an enclosure and a special PLC version of Measure Tracks is stored in the PLC. Pictured above and to the right is the PLC front panel. It has a two line display for viewing two measurements simultaneously. The keypad is used to enter stored programs for different part sizes for routine inspection



of parts.

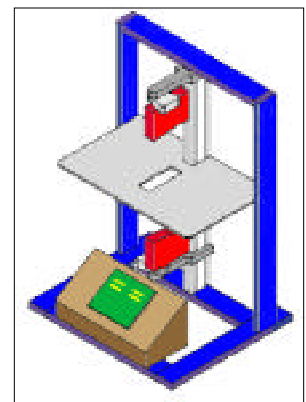
### Height Measurement

The basic 2101 comes as a height measurement system. It can be used where the base plate (anvil) is used as a reference. For parts which are flat, this is a viable option. A picture of the height stand at the right illustrates the round anvil. A part is sitting on the anvil with the geometric laser mounted above on the adjustable height stand. Special anvils are available.



### Thickness Measurement

The 2102 includes two opposing geometric lasers to measure the differential thickness. A metal platen with a hole in the center is mounted between the lasers to hold the part. With this technique, the part does not depend on the datum for a reference. This method is preferable for parts which are not very flat.

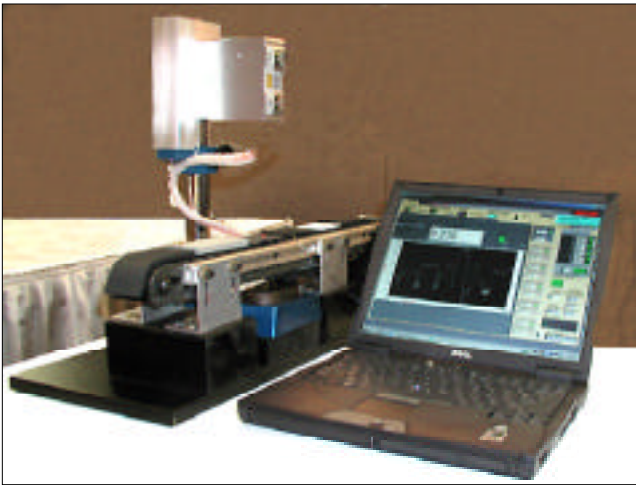


### Measure Tracks

The Measure Tracks data analysis and presentation software is a very simple and flexible program to use. It can be used with a standard PC or our PLC. It is designed for use in a QC department or in an industrial process where the interest in determining statistical data on product measurements is desired and easily accomplished in a very cost effective manner. Measure Tracks can measure width, length, and thickness or displacement along the width or length of any product. The software works with both cut to size stock and continuous materials. Measurement data is taken in from any of our digital geometric laser displacement sensors. The required accuracy and maximum size of the part determines which sensor is to be utilized.

Calibration is an important issue which needs mention. Geometric lasers are not absolute measurement devices, they are relative measurement devices. Therefore, you must calibrate to a known standard. Measure Tracks facilitates an automatic calibration mode. Simply place a known standard on the anvil and enter the standard's size. Measure tracks then self calibrates. You can store numerous calibrations in the PC or PLC for maximum measurement performance on a variety of parts.

Typical Examples

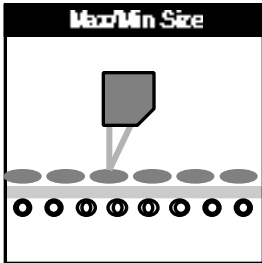


Pictured above is an example of the 2101 which was placed at a conveyor. The purpose of this illustration is to show that the system can also profile parts as they move by the geometric laser. A variety of parts ranging from soft open cell material, plastic and wood have been attached to the conveyor.

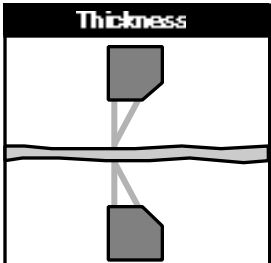
In the case of this application, the Measure Tracks software is installed in a PC. The PC version offers more viewing capability due to the PC's monitor.



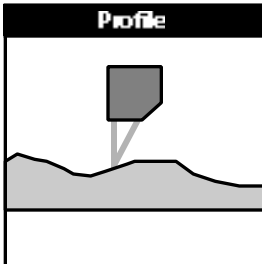
Pictured above is the output measurement of each part as it passes through the beam. The numerical data displayed is the location of the current measurement. There is a vertical line (red) documenting the position. Two horizontal lines (yellow) are the tolerances which have been set for the particular part. As you can see from the display, two parts exceeded the tolerance settings when they passed by the laser.



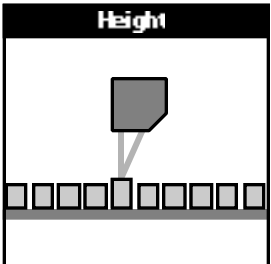
Product size measured in high volume production applications.



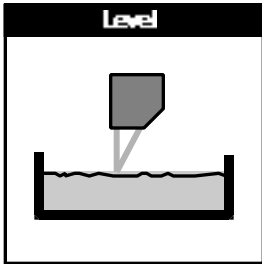
Two sensors measure material thickness as surface moves or vibrates.



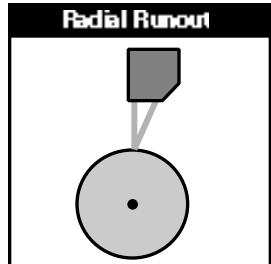
Profile a moving surface with 2000 Hz sampling rate.



Height of parts measured during production process.



Measure the level of opaque liquids to critical tolerances.



Lobing or circular runout measured as wheel revolves at high speed.

Some other typical examples of using the 2100 century series are depicted above. It is just a matter of placing the part under the beam to get the measurement. Some of the examples require fixturing. For example, to measure run out, you need to rotate the part. We offer a variety of standard fixtures, including any special fixture which may be required. The above applications illustrate the variety and flexibility of the 2100 which can measure a wide variety of parts and shapes. Clear parts and mirrors cannot be measured with the geometric laser.

## 2100 Century Series Sensor Specifications

Model	Meas. Range	Standoff Dist.	Resolution	Repeatability	Linearity	Spot Size
GL 10	10mm	51mm	0.2µm	± 4.5µm	± 7µm	0.5 x 1.2mm
	0.394"	2.00"	0.000008"	± 0.0002"	± 0.00028"	0.02 x 0.05"
GL 30	30mm	100mm	0.5µm	± 10µm	± 20µm	0.5 x 1.2mm
	1.18"	3.94"	0.00002"	± 0.0004"	± 0.0008"	0.02 x 0.05"
GL 70	70mm	190mm	1µm	± 20µm	± 45µm	0.5 x 1.2mm
	2.76"	7.48"	0.00004"	± 0.0008"	± 0.0018"	0.02 x 0.05"
GL 130	130mm	315mm	2µm	± 45µm	± 85µm	0.5 x 1.6mm
	5.12"	12.4"	0.00008"	± 0.0018"	± 0.0033"	0.02 x 0.06"
GL 200	200mm	100mm	0.01mm	± 0.025mm	± 0.075mm	3mm
	7.87"	3.94"	0.00039"	± 0.001"	± 0.003"	0.118"
GL 250	250mm	380mm	4µm	± 70µm	± 150µm	0.6 x 1.8mm
	9.84"	14.96"	0.00016"	± 0.0028"	± 0.0059"	0.023 x 0.07"
GL 400	400mm	440mm	6µm	± 140µm	± 500µm	0.7 x 2.0mm
	15.75"	17.32"	0.00024"	± 0.0019"	± 0.0055"	0.028 x 0.08"

## General Specifications

Meas. frequency <sup>1</sup>	800Hz, 2 KHz, and 4KHz
Output signal	Analog, 0/4-20ma, RS 232/485
Wavelength	670nm (red light)
Laser output <sup>1</sup>	1mW (2mW, 5mW)
Laser class <sup>1</sup>	2, (3B)
Protection class	IP 65
Ambient temp.	0° - 45° C (32 - 117° F)
Dimensions	39 x 109 x 168mm, (1.54 x 4.29 x 6.6")
Weight	1.1Kg, (2.45 lbs.)
Power supply	24V DC

## Configurations

## 2101 - PC

- One geometric laser
- One height stand
- Measure tracks for PC

## 2101 - PLC

- One geometric laser
- One height stand
- Measure tracks for PLC
- PLC mounted in a desk top enclosure

## Configurations - continued

## 2102 - PC

- Two geometric lasers
- One stand with centered palate for thickness measurements
- Measure tracks for PC

## 2102 - PLC

- Two geometric lasers
- One stand with centered palate for thickness measurements
- Measure tracks for PLC
- PLC mounted in a desk top enclosure

## Notes:

1. The frequency of measurement is dependent on which GL sensor is selected.



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The closer you look, the better we measure!

Freedom Technologies, LLC.

P.O. Box 117

E. Glastonbury, CT 06025-0117

Tel: (860) 659 9662

Fax: (860) 633 0281

Website: www.freedomlaser.com

Email: sales@freedomlaser.com